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(54) Opening vehicle roof

(57) A vehicle roof (11) has a series of laminae (10a–10e) which in the closed position abut against one another to form a flat composite assembly. Each lamina (10a–10e) is guided along guides on either side of the fixed roof aperture. There are guide means on each lamina at each of two guide locations spaced apart from one another. When the laminae (10a–10e) are displaced in an opening direction the flat composite assembly carries out translatory movement, in the course of which is disassembled, lamina by lamina, starting with the lamina (10a) foremost in the direction of opening. During opening each lamina (10a–10e) pivots in turn about its first guide location guide means. On closing the roof the laminae (10a–10e) pivot back and restore the flat composite assembly. A plurality of individual guide slot tracks 137b–137e branch off from a common guide track 135. The second guide location guide means 82b–82e of respective laminae (10a–10e) co-operate with their associated guide slot tracks, the movement of guide means in the guide slot tracks causing the pivoting movement of the associated laminae (10a–10e) whilst maintaining a robust structure resistant to disruption by wind.

FIG. 4

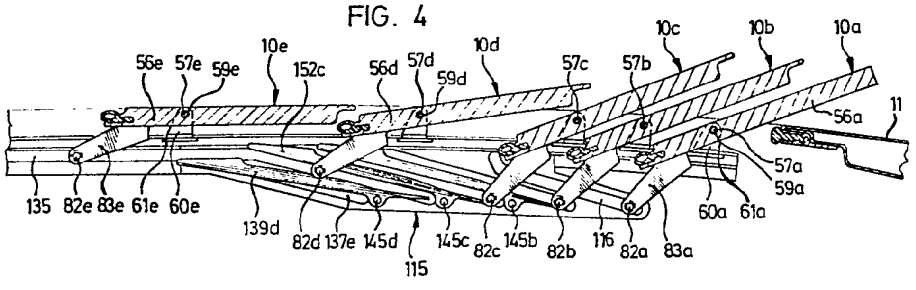

FIG. 5

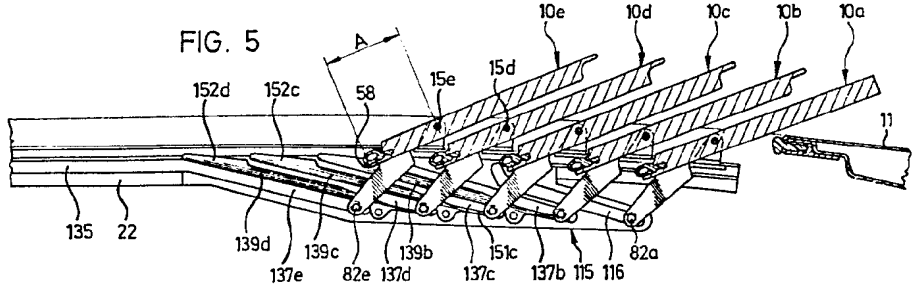

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FIG. 1

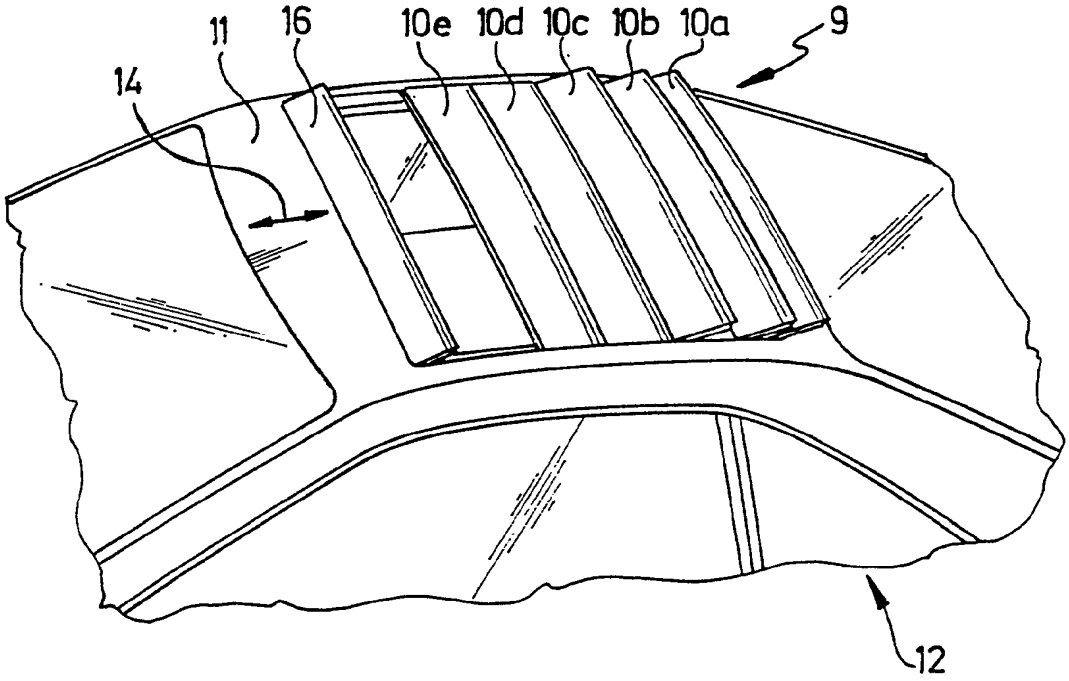
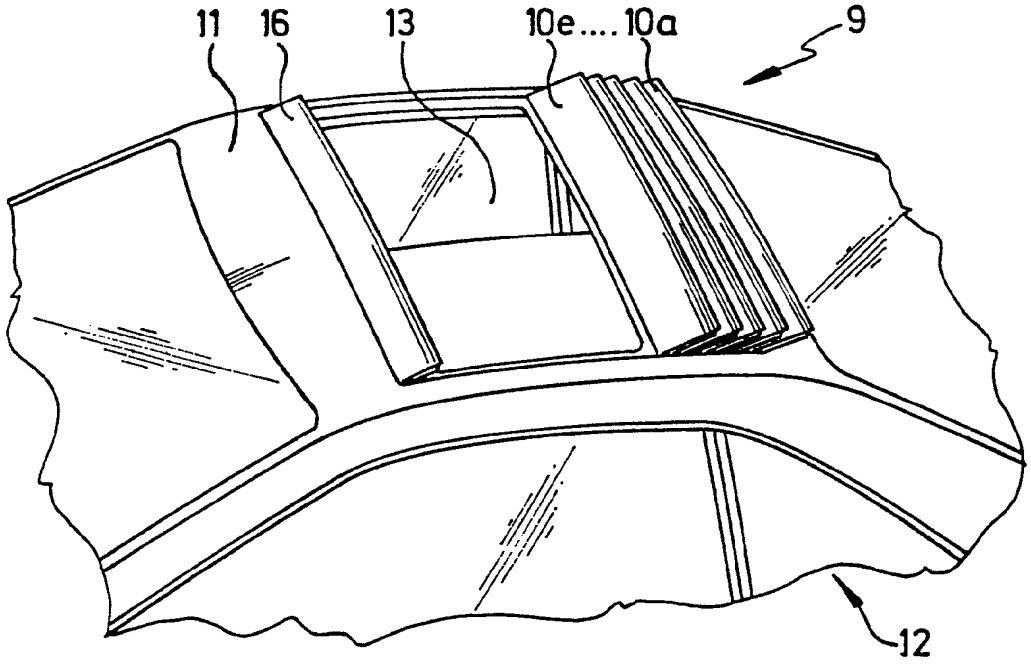


FIG. 2



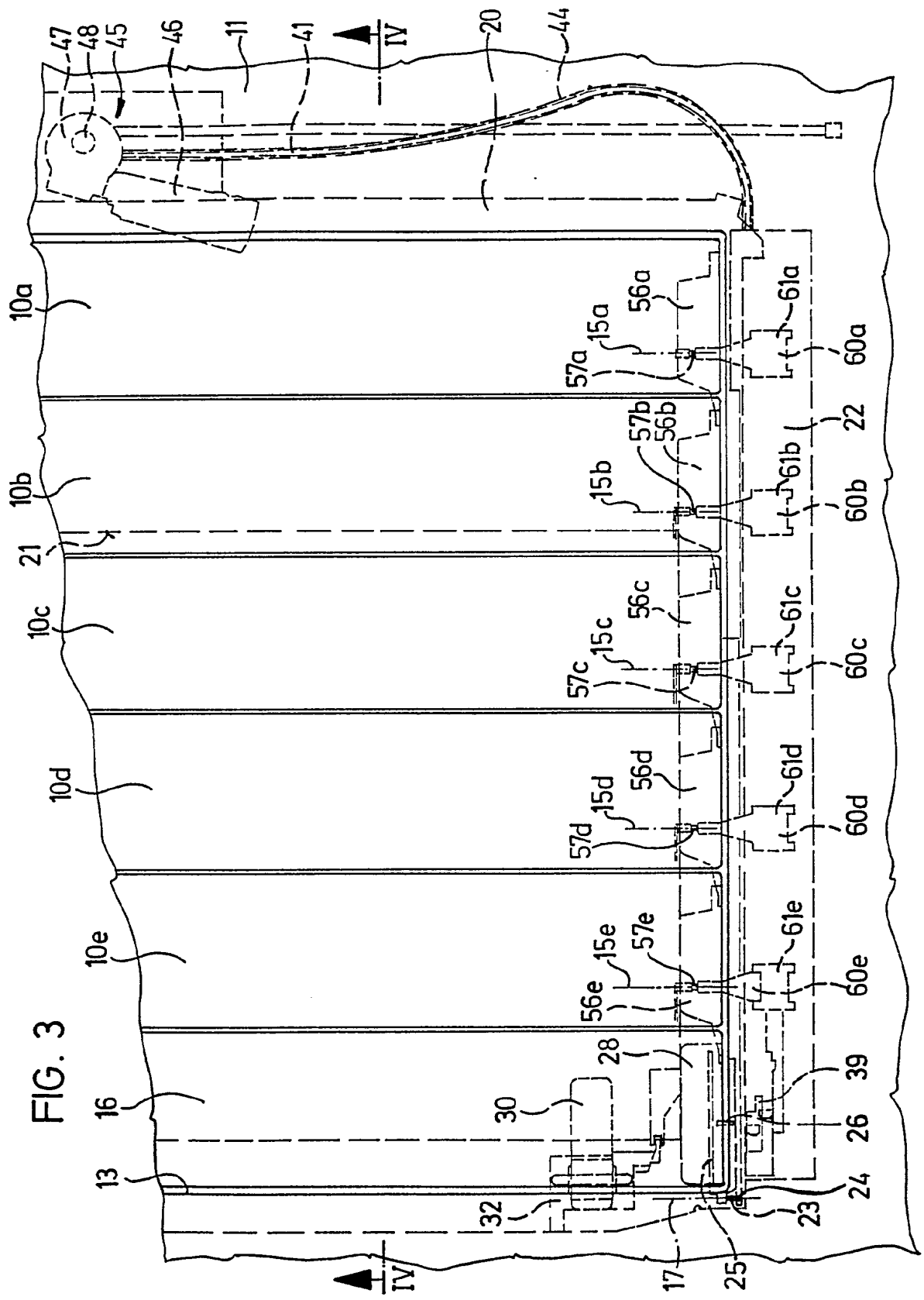

47
48
45
46
11
41
IV
20
44
10a
10b
21
10c
10d
10e
16
13
30
28
32
IV
17
25
23
24
26
39
22
56a
15a
57a
61a
60a
56b
57b
15b
61b
60b
56c
15c
57c
61c
60c
56d
15d
57d
61d
60d
56e
15e
57e
61e
60e

FIG. 3

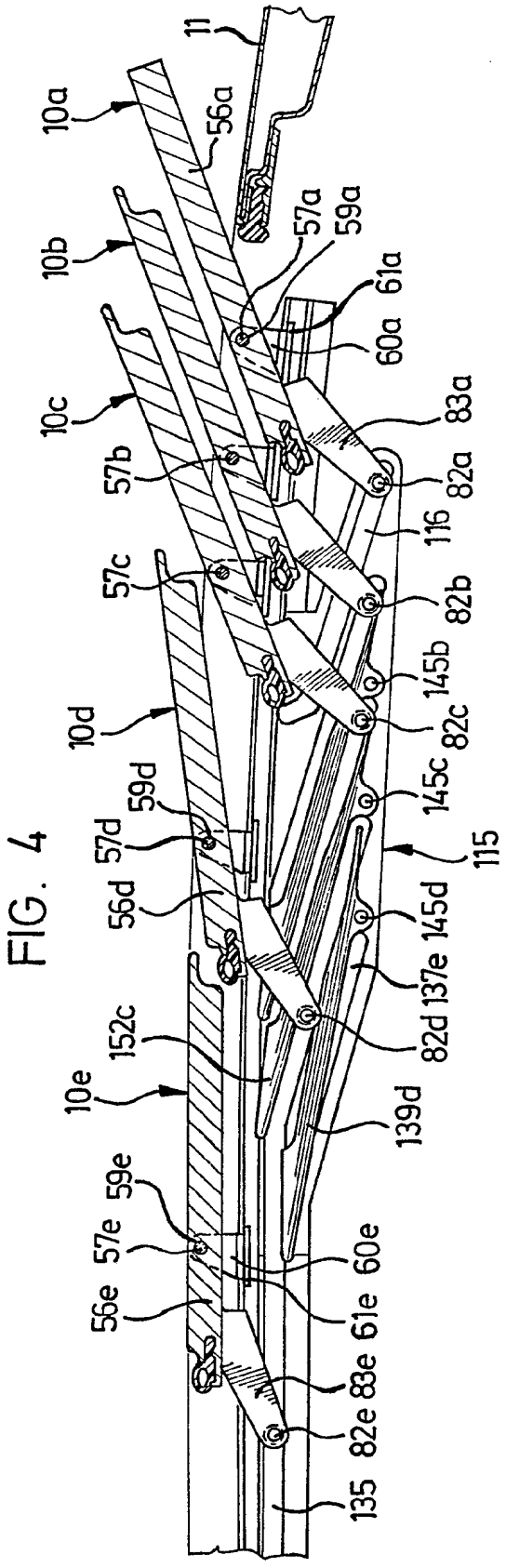
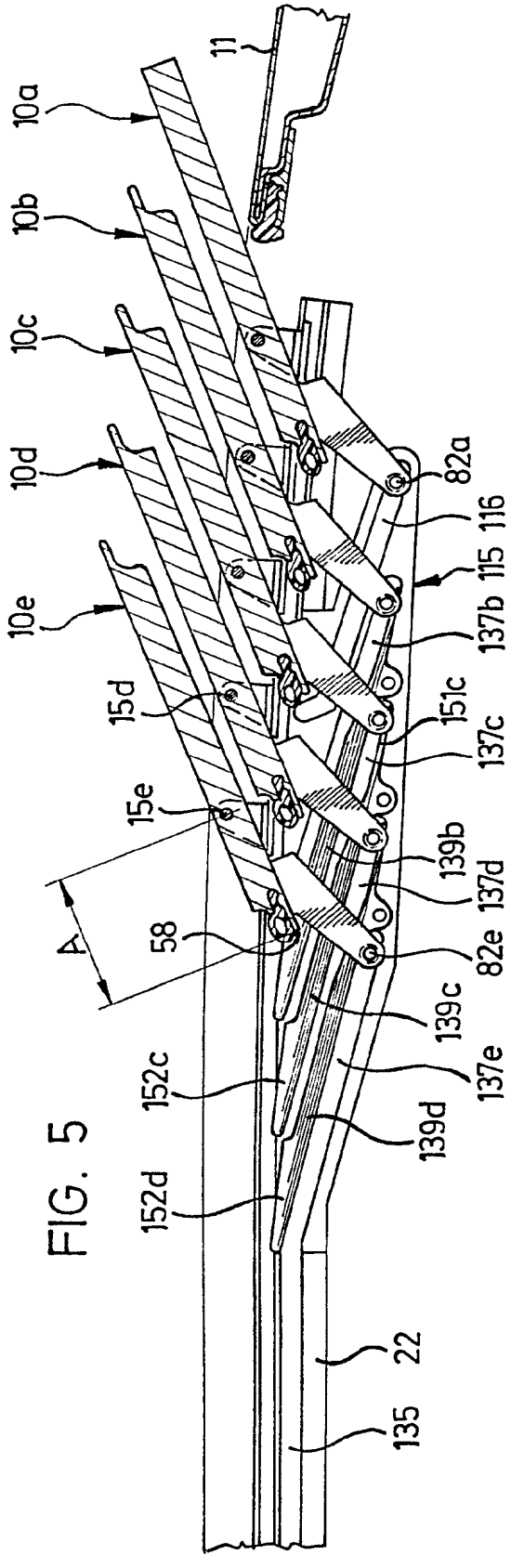

11
10a
56a
57a
59a
10b
61a
60a
10c
83a
57b
82a
116
57c
82b
145b
10d
82c
59d
145c
57d
115
56d
145d
137e
82d
152c
10e
139d
59e
57e
60e
56e
61e
83e
82e
135

FIG. 4


11
10a
10b
10c
10d
82a
116
115
10e
137b
15d
151c
137c
15e
139b
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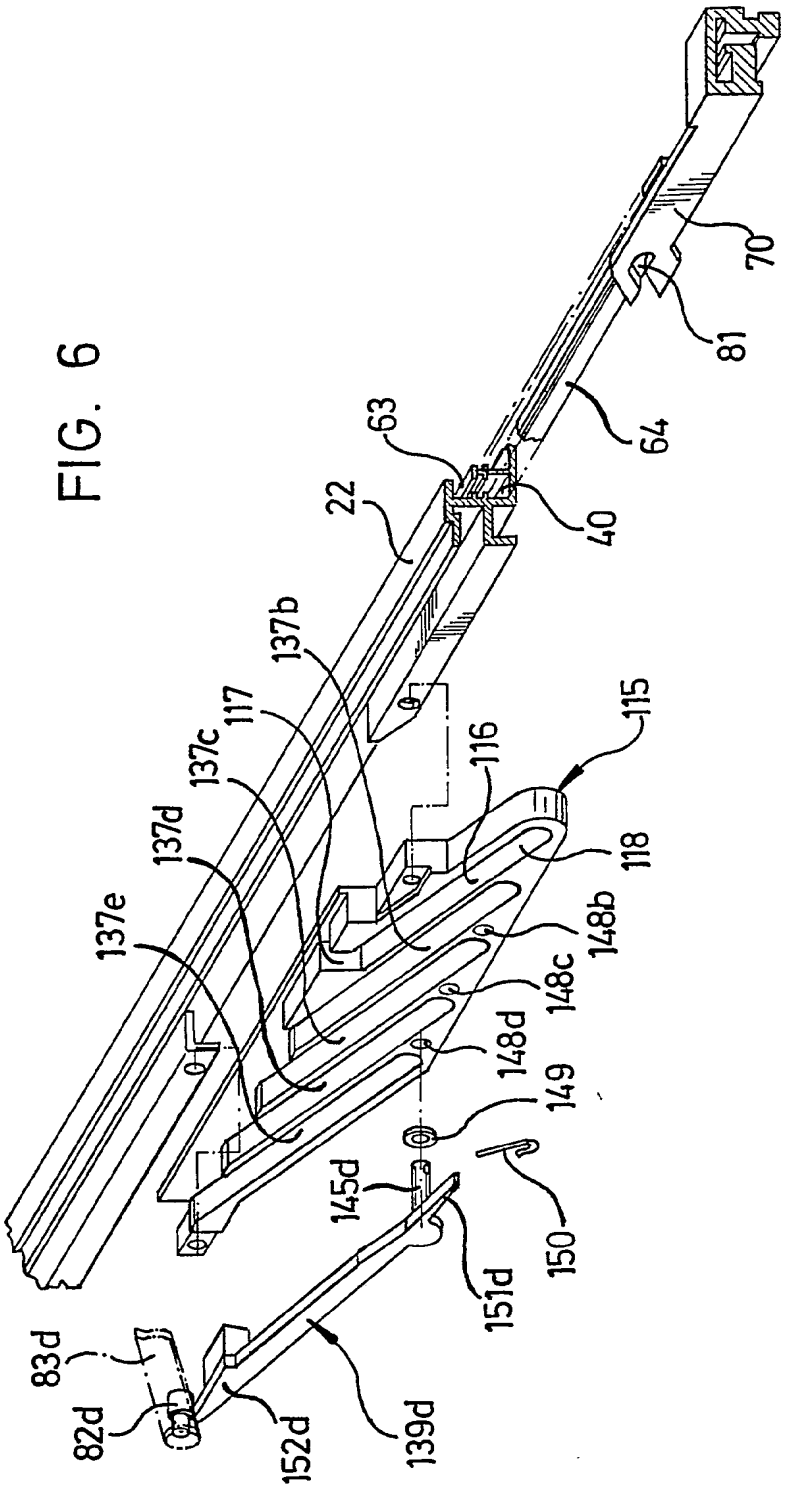
A
58
82e
139c
152c
137e
139d
152d
22
135

FIG. 5

FIG. 6


70
81
64
63
40
22
137b
117
137c
137d
137e
116
115
118
148b
148c
148d
149
145d
151d
150
83d
82d
152d
139d

A VEHICLE ROOF

The invention relates to vehicle roofs having a series of laminae for closing or at least partly closing a roof opening in a fixed roof surface.

In vehicle roofs of this type the laminae abut against one another in the closed position and form a flat composite sheet. Each lamina has guide means on either side guided along guides at two guide locations which are spaced apart from one another in the direction of displacement. When the laminae are displaced, the flat composite sheet undergoes a translatory movement. When the composite moves so as to open the roof opening the individual laminae each pivot in turn about the guides of the first of their two guide locations. In doing so the laminae are removed from the flat composite assembly in turn one after the other. On closing the roof, the opening movements are reversed and the flat composite assembly is restored lamina by lamina. The second guide location guide means of the laminae when forming the flat composite assembly run in the same guide track.

In a known vehicle roof of this type (DE-Gbm 1811690), there are guide means at two guide locations for each lamina. These guides are formed by journals, each of which projects laterally from a guide cheek provided on the underside of the respective lamina. The two journals are situated at a different height and engage in guide tracks, which are situated parallel to and spaced apart from one another, of a guide rail secured to the roof. Upon opening the roof, the journals respectively situated at the front in opening direction successively leave the associated guide track, while in a manner not described in detail the respective lamina is simultaneously caused to undergo a pivoting movement about the journal remaining in its guide track. The rigidity of the known vehicle roof leaves a lot to be desired, particularly when the roof is at least partly open. Moreover, the known arrangement cannot be applied to vehicle roofs which are

curved in conventional manner transversely to the longitudinal axis of the vehicle.

Another vehicle roof comprising a series of laminae is known from DE 3532150 C1. When opening the closed roof the laminae are pivoted via a spindle drive initially together into an upwardly pivoted-out position and are then pushed back rearwards. In this roof, therefore, the flat composite assembly is broken up straightaway when the roof is to be opened. This is aerodynamically unfavourable and unpleasant wind noise can occur even when the vehicle is travelling at relatively low speed.

In another vehicle roof (GB-PS 573355) a series of laminae is provided, which are respectively associated with longitudinal guide tracks which are situated at different heights and along which the laminae are slidably guided via articulated parallelograms. To open the previously closed roof, the laminae can be brought into different vertical positions and then pushed together. No adjustment of the laminae is provided. Therefore, at least a part of the roof opening corresponding to the width of one lamina remains closed.

A vehicle roof of the type indicated in the introduction, in which to increase stability and for secure retention of the laminae both guide points of the laminae are retained in engagement with the guide throughout the entire displacement range of the laminae, is described in United Kingdom Patent Application No. 9214862.6.

The invention is based on the object of devising a vehicle roof which in all roof positions is distinguished by high rigidity and secure retention of the laminae, which has aerodynamically favourable behaviour even at relatively high vehicle speeds, without thereby having to refrain from uncovering a substantial portion of the roof opening, and in which satisfactory pivoting of the laminae is ensured even under the rough conditions to which a vehicle roof is subjected in practice.

Accordingly the present invention provides a vehicle roof for installing in an aperture in a fixed roof surface comprising a pair of spaced guides rigid with the roof a series of movable laminae for closing or at least partially opening the roof aperture, the laminae abutting one another to form a flat composite assembly of laminae when in the closed position, each lamina being provided with respective guide means associated with each said guide, each guide means providing guidance at two guide locations which are spaced apart from one another in the direction of displacement, the movement of the laminae in an opening direction resulting in the translatory movement of the flat composite assembly in the opening direction, each lamina in turn, starting with the lamina foremost in the opening direction, being removed from the flat composite assembly by pivoting movement about each guide means at a first of the two said guide locations, on closing the roof aperture the flat composite assembly being restored lamina by lamina by a reversal of the opening movements, the guide means at the second guide location for each lamina when part of the flat composite assembly running in a common guide track, wherein a plurality of individual guide slot tracks branch off from the common guide track, the second guide location guide means of each lamina co-operating with respective guide slot tracks to induce the pivoting of that individual lamina.

The individual laminae therefore are constrained to pivot at an accurately predetermined location when they are displaced in the opening or closing direction. In the pivoted-out condition the laminae occupy a definite position relative to one another.

Preferably, at least a portion of each guide slot track is associated with a deflector which, on co-operating with the second guide location guide means of the associated lamina blocks the entrance to the guide slot track to the entry of a second guide location guide means of another lamina.

The arrangement ensures that the second guide location guide means of the laminae co-operate only with the individual guide slot tracks facing towards them. Faulty operation is prevented such as displacement of the roof due to the vehicle having to undergo heavy braking.

The deflectors are preferably preloaded so that they do not block the entrance to their respective guide slot tracks the deflectors being switched over into their blocking positions by co-operation with second guide location guide means of their associated laminae.

Preferably, the deflectors are pivotably mounted and are pivoted into their blocking position by the pressing of the second guide point location guide means of the respective lamina against the restoring force of a spring.

Preferably, the guide means at both first and second guide locations of each lamina in constant engagement with their respective guides throughout the entire displacement range of the laminae.

Even strong wind forces can be reliably accommodated as result of the fact that the laminae are doubly guided, even in the pivoted-out condition. Any chattering and rattling of the laminae is reliably prevented. In all positions the laminae can be retained in accurately predetermined positions relative to one another and relative to the parts secured to the roof.

Preferably, the guide means at the first guide location are pivotably mounted on respective slide members displaceable along longitudinal guides, the pivot axis for each slide member extending transversely to the direction of displacement of the laminae.

The guide slot tracks are preferably formed so that in a fully pivoted-out condition the laminae are disposed parallel to one another.

The guides are preferably secured to the vehicle roof.

Preferably, the second guide location guide means of each lamina are respectively offset downwards and in the closing

direction in relation to the first guide location guide means of the same lamina.

Preferably, the second guide location guide means of the laminae can be a link pin mounted on a portion securely connected to the respective lamina and which projects obliquely downwards from the lamina.

The invention includes a kit of parts for assembly to provide a vehicle roof as herein defined.

The invention also includes a vehicle comprising a vehicle roof as herein defined.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a multi-strip roof in the partly opened condition;

Figure 2 is a perspective view corresponding to Figure 1 with the roof fully open;

Figure 3 is a partial plan view of one side of the vehicle roof in the closed position;

Figure 4 is an enlarged scale partial longitudinal section along the line IV-IV in Figure 3, in which the roof is partly open;

Figure 5 is a partial longitudinal section corresponding to Figure 4, in which the roof is fully open;

Figure 6 is a partial perspective view of the guide on side of the roof with a guide slot insert and one of the deflectors.

The vehicle roof 9 shown generally in Figures 1 and 2 is a multi-strip roof. There are a series of sliding laminae 10a to 10e. These laminae serve to selectively close or at least partly uncover a roof opening 13 which is formed in a fixed roof surface 11 of a motor vehicle 12. The laminae 10a to 10e can be displaced so as to open and close the roof 9, the direction of displacement indicated by the double arrow 14 extending parallel to the direction of travel. Other directions of displacement are of course possible, for example

displacement could be in a direction which is transverse to the longitudinal axis of the vehicle. In their closed position, the laminae 10a to 10e abut tightly against one another with their longitudinal edges extending transversely to the direction of displacement 14. In this position they form a planar composite sheet, as is indicated in Figure 1 for the two laminae 10d and 10e. The laminae 10a to 10e are also pivotable about respective pivot axes 15a to 15e (Figure 3) extending transversely to the direction of displacement 14.

A displacement mechanism, which is illustrated and described in detail in German Patent Application P 4123229.1, co-ordinates the sliding and pivoting movements of the individual laminae 10a to 10e. The mechanism is such that during the displacement of the sliding laminae, the planar composite sheet carries out a translational movement in the direction of displacement 14. Also, during the opening of the roof 9, the planar composite sheet is disassembled starting with the lamina in front in the opening direction. Further lamina in turn are disassembled from the planar composite sheet as opening proceeds. The planar composite assembly is re-established upon closing the roof lamina by lamina in the reverse sequence to the opening sequence. On opening the previously closed roof 9, initially only the lamina 10a is disengaged from the planar composite sheet, by said lamina being pivoted so that at its rear edge it is freed from the rear edge if the roof opening 13. Then, starting from this inclined position, the lamina 10a can be displaced rearwards together with the other laminae 10b to 10e remaining in the planar composite sheet, i.e. those lamina not pivoted out, the lamina 10a continuing to be pivoted into its end position. Once the lamina 10a has reached its rear end position shown in Figures 1 an 2, the next lamina 10b is pivoted out. This cycle is repeated until, in accordance with Figure 2, all the sliding laminae 10a to 10e are pivoted out and displaced rearwards into their open position. Upon closing the roof 9, starting from the open position in Figure 2, firstly only the

lamina 10e is moved forwards and pivoted back into a position parallel to the fixed roof surface 11. A corresponding movement sequence necessarily takes place successively for the following laminae 10d to 10e until the laminae are disposed in a planar composite at their front end position and close the roof opening 13.

In the embodiment of the vehicle roof 9 shown, an air deflector 16, which can be pivoted out, is provided in the vicinity of the front end of the roof opening 13. At the beginning of the opening operation said deflector is pivoted about a virtual pivot axis extending transversely to the longitudinal axis of the vehicle into an inclined rearwardly ascending position. In the closed position of the roof 9, the air deflector 16 has its rear edge flush up against the front edge of the sliding lamina 10e situated in the front end position. The air deflector 16 therefore closes the frontmost part of the roof opening 13. Optionally, however, the design can be such that, in the closed position, the planar composite sheet of the laminae 10a to 10e extends from the front edge to the rear edge of the roof opening 13 and thus takes on the closing function by itself. Optionally, in a manner known per se for sliding roofs (DE-OS 2325594, DE-OS 3426998 and DE-PS 3916906) an air deflector can be provided here which disappears under the fixed roof surface when the roof is closed and which automatically assumes an operative position when the roof is opened. A vehicle roof with five sliding laminae 10a to 10e is illustrated in Figures 1 and 2. However, it is obvious that in principle the number of sliding laminae can be chosen as desired depending on the particular circumstances.

As is evident from Figure 3, the vehicle roof 9 has a roof frame 20 which is mounted under the fixed roof surface 11 and which extends around the roof opening 13 and defines a frame opening 21. On both sides, the roof frame 20 has a respective guide rail 22 extending in the direction of displacement 14. The design is substantially mirror-

symmetrical relative to a longitudinal centre line on both sides of the roof 9, so that the illustrations and explanation for one side of the roof naturally also apply to the other side of the roof. At the front end of each of the guide rails 22 is mounted a pivot bearing 23 which accommodates a bearing pin 24. The latter is mounted at the front end of a support 25 for the air deflector 16. The pivot bearing 23 of the guide rails on both sides of the roof define a pivot axis 17 for the support 25 fixed to the roof. A guide pin 26 projects laterally outwards from a position of the air deflector support 25 which is offset rearwardly relative to the bearing pin 24. The guide pin 26 engages in a guide slot track formed on that side of a pivoting-out slotted link 28 which is secured to the frame and which faces the roof opening 13. On the underside and near to the front end of the air deflector 16 a pivot bearing tongue 30 is respectively secured on either side, which engages in a curved recess 31 (not shown) in a pivot bearing block 32 mounted on the roof frame 20. This assembly forms the virtual pivot axis for the air deflector 16.

The pivoting-out slotted link 28 serving for the pivoting of the air deflector 16 is guided for longitudinal displacement to a limited extent along the guide rail 22. To displace the pivoting-out slotted link 28, this guide slot is connected for entrainment via a coupling, for example a locking block coupling, with a coupling member 39. The coupling member 39 is itself guided to slide along a lower guide track 40 (Figure 6) of the guide rail 22 and it is securely connected to a drive cable 41. The drive cable 41, which is preferably in the form of a screw-threaded cable, extends through a cable-guide channel in the guide rail 22 and through a guide tube 44 (Figure 3), which is adjoined thereto in the rear zone of the roof frame 20, to a drive unit 45. In the embodiment illustrated by way of example, the latter have an electric motor 46 and a reduction gear 47. A pinion 48, which is connected with the output of the reduction gear

47, is in engagement with the drive cable 41 and with a corresponding drive cable for the other side of the roof.

The sliding laminae 10a to 10e are each mounted on respective lamina supports 56a to 56e on either side of the roof opening 13. On each of the lamina supports 56a to 56e there is disposed a pivot bearing pin 57a to 57e which is aligned transversely to the direction of displacement 14 and which defines one of the pivot axes 15a to 15e about which the respective lamina 10a to 10e are pivoted during the opening and closing of the roof 9. In the embodiment illustrated by way of example, each of the pivot axes 15a to 15e is offset to the rear by a certain extent A (Figure 5) relative to the front edge 58 of the respective lamina. The pivot bearing pins 57a to 57e each engage in a bearing aperture 59a to 59e (Figures 4 and 5) at the inner end of a slide member 60a to 60e. The slide members 60a to 60e respectively associated with one of the laminae 10a to 10e are guided slidably along the guide rail 22. For this purpose, the slide members 60a to 60e are each provided with a sliding bearing 61a to 61e at their outer end remote from the bearing aperture 59a to 59e. The sliding bearings have guide blocks which engage in at least one upper guide groove 63 (Figure 6) of the guide rail 22.

A drive bar 64 (Figure 6) is guided for longitudinal displacement in a guide channel of the guide rail 22. The drive bar 64 can be connected for entrainment via a coupling, preferably a locking block coupling, with the coupling member 39. A raising slotted link 70 associated with the lamina 10a is mounted for displacement to a limited extent near to the rear end of the guide rail 22 (Figure 6). The raising slotted link 70 can itself be coupled with the drive bar 64. The raising slotted link 70 is coupled to the drive bar 64 when the drive bar 64 is moved rearwards to a predetermined extent. The drive bar 64 is entrained rearwards by the coupling member 39 during the opening of the roof. The raising slotted link 70 has a guide slot track 81 which is inclined downwards and

forwards, and which is open at its lower front end. A link pin 82a co-operates with the guide slot track 81. The link pin 82a protrudes laterally from a link 83a of the lamina support 56a. This link is directed forwards and downwards from the front end of the lamina support 56a. In the closed position of the roof it extends to below the lamina support 56b of the next lamina 10b.

As a result of the displacement of the raising slotted link rearwards, the link pin 82a engaging in the guide slot track 81 is pressed downwards. The lamina support 56a is pivoted about the pivot bearing pin 57a, in Figure 4, in an anti-clockwise direction, whereby the rear end of the lamina 10a mounted on the lamina support 56a is raised above the level of the fixed roof surface 11 rearwardly adjoining the roof opening 13. During the pivoting-out movement, the lamina 10a clears the rear edge of the roof opening 13. Subsequently, the lamina 10a can be displaced rearwards, whereupon the pivoting-out movement of the lamina 10a continues, without the lamina colliding with the fixed roof surface 11.

The sliding bearings 61a to 61e and thus also the sliding member 60a to 60e of the laminae 10a to 10e are releasably connected to one another via connecting rods (not shown) which are guided for displacement in guide tracks of the guide rail 22. In particular, sliding block couplings are once more suitable for such a releasable connection.

During the opening of the roof 9, as soon as the rearmost lamina 10a is raised in the above-described manner with its rear edge above the fixed roof surface 11, the entire laminar composite is entrained rearwards by way of the coupling member 39.

A pivoting-out guide 115 securely connected with the rear part of the guide rail 22 has a guide slot track 116 which is directed obliquely rearwards and downwards, and in which the link pin 82a engages. The guide slot track 116 is provided with a front relatively steep branch 117 and with a rear less

steep branch 118. During the initial pivoting movement of the sliding lamina 10a, the link pin 82a travels downwards into the front branch 118. The lamina 10a is thereby pivoted further in an anti-clockwise direction (Figure 4) as the lamina 10a is displaced rearwards. When the lamina 10a has reached its pivoting-out end position in accordance with Figures 4 and 5, the drive connection between the rearmost sliding bearing 61a and the sliding bearing 61b disposed in front thereof is disengaged. The rearmost sliding lamina 10a is uncoupled from the drive. The sliding member 60a is located relative to the guide rail 22.

The lamina supports 56b to 56e have links 83b to 83e which correspond to the link 83a of the lamina support 56a and likewise extend obliquely forwards and downwards, and which at their free end have a respective laterally projecting link pin 82b to 82e. In the closed position of the roof 9, the link pins 82a to 82e are guided for displacement in a common guide track 135 of the guide rail 22 associated with this link pin. The common guide track 135 extends parallel to the guide track 40 and the guide track 63 of the guide rail 22. Guide slot tracks 137b to 137e, which branch off from the common guide track 135, are formed in the pivoting-out guide 115 and are inclined downwards and rearwards. Deflectors 139b to 139d are associated respectively with the guide slot tracks 137b to 137e. Pivot pins 145b to 145d are secured respectively to the deflectors 139b to 139d, are pivotably mounted in respective bearing apertures 148b to 148d of the pivoting-out guide 115 and are prevented from sliding out of the respective bearing aperture by means of a retaining ring 149. A spring clip 150 is fitted on each of the pivot pins 145b to 145d and preloads the respective deflector 139b to 139d in anti-clockwise direction, Figures 4, 5 and 6. In this preloaded position, which is illustrated in Figure 4 for the deflector 139d, the deflector leaves free the guide track 135 for the passage of the link pins 82b to 82d.

A respective fixed stop member, which determines the rear end position of the connecting bars releasably connecting the sliding bearings 61a to 61e, is fitted in the lower guide track 40 and corresponding further guide tracks of the guide rail 22. When the laminar composite is displaced rearwards, firstly the connecting bar between the sliding bearings 61a and 61b encounter the associated fixed stop member. By continued action of the drive force on the laminar composite the drive connection is disengaged between the rearmost sliding bearing 61a and the sliding bearing 61b situated in front thereof. The rearmost sliding lamina 10a is uncoupled from the drive. The slide member 60a is located relative to the guide rail 22. During the initial displacement of the composite sheet 10a to 10e, the link pins 82b to 82e move along the common guide track 135. Accordingly, the laminae 10b to 10e are displaced in translational motion parallel to the guide rail 22. After the lamina 10a has been uncoupled from the drive in the manner described above, the link pin 82b passes from the guide track 135 into the guide slot track 137b. As the lamina 10b continues to be moved rearwards, this lamina is thereby simultaneously constrained to pivot about the pivot axis 15b defined by the pivot bearing pin 57b. As the link pin 82b approaches the rear end of the guide slot track 137b, it encounters the rear lower end of the deflector 139b, whereby the deflector 139b is pivoted in clockwise direction counter to the force of the associated spring 150, Figures 4 to 6. The result of this is that the deflector 139b closes with its front upper end 152b the guide track 135. In this way the guide slot track 137b is closed off for the entry of the link pin of other laminae. Upon further rearward displacement of the laminar composite, it is ensured that the link pin 82c of the lamina support 56c of the next forward lamina 10c enters the guide slot track 137c. The same procedure is repeated for the other lamina.

Upon closing the roof 9, the operation described above for the opening procedure take place in reverse.

CLAIMS

1. A vehicle roof for installing in an aperture in a fixed roof surface comprising a pair of spaced guides rigid with the roof, a series of movable laminae for closing or at least partially opening the roof aperture, the laminae abutting one another to form a flat composite assembly of laminae when in the closed position, each lamina being provided with respective guide means associated with each said guide, each guide means providing guidance at two guide locations which are spaced apart from one another in the direction of displacement, the movement of the laminae in an opening direction resulting in the translatory movement of the flat composite assembly in the opening direction, each lamina in turn starting with the lamina foremost in the opening direction, being removed from the flat composite assembly by pivoting movement about each guide means at a first of the two said guide locations, on closing the roof aperture the flat composite assembly being restored lamina by lamina by a reversal of the opening movements, the guide means at the second guide location for each lamina when part of the flat composite assembly running in a common guide track, wherein a plurality of individual guide slot tracks branch off from the common guide track, the second guide location guide means of each lamina co-operating with a respective guide slot track to induce the pivoting of that individual lamina.

2. A roof as claimed in Claim 1, wherein at least a portion of each guide slot track is associated with a deflector which, on co-operating with the second guide location guide means of the associated lamina blocks the entrance to the guide slot track to the entry of a second guide location guide means of another lamina.

3. A roof as claimed in Claim 2, wherein the deflectors are preferably preloaded so that they do not block the entrance to their respective guide slot tracks the deflectors being

switched over into their blocking positions by co-operation with second guide location guide means of their associated laminae.

4. A roof as claimed in Claim 3, wherein the deflectors are pivotably mounted and are pivoted into their blocking position by the pressing of the second guide point location guide means of the respective lamina against the restoring force of a spring.

5. A roof as claimed in any preceding claim, wherein the guide means at both first and second guide locations of each lamina are in constant engagement with their respective guides throughout the entire displacement range of the laminae.

6. A roof as claimed in any preceding claim, wherein the guide means at the first guide location are pivotably mounted on respective slide members displaceable along longitudinal guides, the pivot axis for each slide member extending transversely to the direction of displacement of the laminae.

7. A roof as claimed in any preceding claim, wherein the guide slot tracks are preferably formed so that in a fully pivoted-out condition the laminae are disposed parallel to one another.

8. A roof as claimed in any preceding claim, wherein the guides are secured to the vehicle roof.

9. A roof as claimed in any preceding claim, wherein the second guide location guide means of each lamina are respectively offset downwards and in the closing direction in relation to the first guide means of the same lamina.

10. A roof as claimed in any preceding claim, wherein the second guide location guide means of the laminae can be a link pin mounted on a portion securely connected to the respective lamina and which projects obliquely downwards from the lamina.

11. A roof substantially as hereinbefore described or as illustrated in any one of Figures 1 to 6.

12. A kit of parts for assembly to provide a vehicle roof as claimed in any preceding claim.

13. A vehicle incorporating a vehicle roof as claimed in any one of Claims 1 to 11.

14. A vehicle roof with a series of laminae for selectively closing or at least partly uncovering a roof opening in a fixed roof surface, wherein the laminae abut against one another in the closed position and form a planar laminar composite, within which each lamina is guided along guides on either side at two guide points situated at a distance from one another in the direction of displacement, so that when the laminae are displaced the planar laminar composite carries out translational motion, in the course of which the composite is released forwards in the opening direction by each one of the individual laminae pivoting about a first one of its two guide points, lamina by lamina, as the roof is opened, or is re-established upon closing the roof, and wherein the respective second guide points of at least one part of the laminae co-operate during the translational motion of the laminar composite with a guide track commonly associated with one of these laminae, characterised in that a plurality of individual guide slot tracks (137b to 137e) branch off from the common guide track and, in co-operation with the respective second guide points (link pins 82b to 82e), they induce the pivoting of a respective predetermined individual lamina (10b to 10e).

15. A vehicle roof according to Claim 14, characterised in that at least one portion (137b to 137d) of the individual guide slot tracks is respectively associated with a deflector (139b to 139d) which, upon opening the roof (9) after the second guide point (link pins 82b to 82d) of the associated lamina (10b to 10d) has entered the guide slot track, closes off the latter to the entry of the second guide point of further laminae.

16. A vehicle roof according to Claim 15, characterised in that the deflectors (139b to 139d) are preloaded into a position freeing the guide slot tracks (137b to 137d) and they can be switched over into their shutting-off position by means of the respective associated laminae.

17. A vehicle roof according to Claim 16, characterised in that the deflectors (139b to 139d) are pivotably mounted and can be pivoted into their shutting-off position by application of the second guide point (link pins 82b to 82d) of the respective associated lamina (10b to 10d) against the restoring force of a spring.

18. A vehicle roof according to any one of Claims 14 to 17, characterised in that both guide points (pivot bearing pins 57a to 57e, link pins 82b to 82d) of the laminae (10a to 10e) are retained in engagement with the guides (guide rail 22; guide slot tracks 116 and 137b to 137e; guide track 135) throughout the entire displacement range of the laminae.

19. A vehicle roof according to any one of Claims 14 to 18, characterised in that at their first guide point (pivot bearing pins 57a to 57e) the laminae (10a to 10e) are rotatably mounted on a respective slide member (60a to 60e), which is displaceable along longitudinal guides (guide rail 22), about a pivot axis (15a to 15e) extending transversely to the direction of displacement 14 of the laminae.

20. A vehicle roof according to any one of Claims 14 to 19, characterised in that the guide slot tracks (116; 137b to 137e) are so formed that in the fully pivoted-out condition the laminae (10a to 10e) are disposed parallel to one another.

21. A vehicle roof according to any one of Claims 14 to 20, characterised in that the guides (guide rail 22; guide slot tracks (116 and 137b to 137e, guide track 135) are formed secured to the roof.

22. A vehicle roof according to any one of Claims 14 to 21, characterised in that the second guide point (link pins 82a to 82e) of each lamina (10a to 10e) is respectively arranged offset downwards and in the closing direction in relation to the first guide point (pivot bearing pins 57a to 57e) of this lamina.

23. A vehicle roof according to any one of Claims 14 to 22, characterised in that the second guide point of the laminae (10a to 10e) can respectively take the form of a link pin (82a to 82e) which is mounted on a link which is securely connected to the respective lamina and which projects obliquely downwards from the associated lamina.

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Databases (see over)

(i) UK Patent Office

(ii)

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Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2113623 A (FORD) figures 3-5	1 and 4 at least

Category	Identity of document and relevant passages	Relevant to claim(s)

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